

Mark Scheme Mock Paper

GCSE

Methods in Mathematics (Pilot)
Paper: 2MM01/1H

NOTES ON MARKING PRINCIPLES

- 1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- 2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- 3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- 4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- 5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- 6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:
 - i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.
 - ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.
 - iii) *organise information clearly and coherently, using specialist vocabulary when appropriate.*
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If it is clear from the working that the “correct” answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

Probability answers must be given as fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

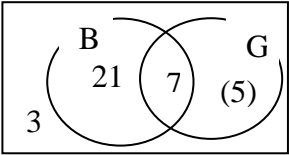
Unless otherwise stated, when an answer is given as a range (e.g 3.5 - 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme

M1 - method mark
A1 - accuracy mark
B1 - Working mark
C1 - communication mark
QWC - quality of written communication
oe - or equivalent
cao - correct answer only
ft - follow through
sc - special case
dep - dependent (on a previous mark or conclusion)
indep - independent
isw - ignore subsequent working

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Question	Working	Answer	Mark	Notes
1	(a)	2028	1	B1 cao
	(b)	20280	1	B1 cao
	(c)	7.8	1	B1 cao
2	(a)	$1 - (0.1 + 0.2 + 0.3)$	2	M1 for $1 - (0.1 + 0.2 + 0.3)$ A1 for 0.4 oe
	(b)	30×0.2	2	M1 for 30×0.2 A1 cao
3	(a)	Shape at (6,0)(4,0)(6,2)(4,1)	1	B1 cao
	(b)	Rotation of 90° clockwise about (0,0)	3	B1 for rotation B1 for 90° clockwise or 270° anticlockwise B1 for centre (0,0)
*4		$y = 3x + 4$ drawn	4	C1 for axes scaled and labelled M2 for two correct points plotted or a correct straight line which does not cover the range $x = -2$ to $x = 2$ (M1 for one point correctly plotted or calculated or a straight line through one correct point) A1 for correct line between -2 and 2 OR C1 for axes scaled and labelled M1 for line with correct gradient M1 for line with correct y intercept A1 for correct line between -2 and 2

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Question	Working	Answer	Mark	Notes
5 (a)		$2 \times 2 \times 3 \times 3$	2	M1 for attempt at continual prime factorisation (at least two correct divisions) could be shown on a factor tree A1 cao
(b)		72	2	M1 for at least 2 multiples of 24 and 36 or attempt at prime factorisation of 24# A1 cao
6 (a)		$\frac{6}{35}$	1	B1 cao
(b)		$5\frac{2}{15}$	3	M1 for attempt to convert to fractions with a common denominator A1 correct conversions $\frac{12}{15}$ or $\frac{10}{15}$ or $\frac{102}{15}$ or $\frac{25}{10}$ A1 $\frac{62}{15}$ oe
7 (a)		$8x + 7y$	2	M1 for $6x + 15y$ or $2x - 8y$ A1 cao
(b)		$4(3g - 5)$	1	B2 cao (B1 for $2(6g - 10)$)
(c)		x^{11}	1	B1 cao
(d)		$4x^4y^7$	2	B2 cao (B1 for $4x^4y^n$ or ax^4y^7 or $4x^ny^7$)
(e)		$t^2 + 11t + 18$	2	M1 for 4 correct terms with or without signs or 3 out of no more than 4 terms, with correct signs (Terms may be seen in an expression or in a table) A1 cao

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Question	Working	Answer	Mark	Notes
8 (i)		$\frac{1}{4}$	5	M1 for attempt to find combinations could be in a sample space or listing of correct pairs M1 for 3 pairs identified A1 for $\frac{3}{12}$ oe
(ii)		$\frac{1}{2}$		M1 for 6 pairs identified A1 for $\frac{6}{12}$ oe
9		44	5	M2 for $4 \times 5x = 2 \times (2x + 1) + 2 \times (4x + 5)$ or $2 \times 5x = 2x + 1 + 4x + 5$ (M1 for $4 \times 5x$ oe or $2 \times (2x + 1) + 2 \times (4x + 5)$ oe) A1 $x = 1.5$ oe M1 for $(2 \times "1.5" + 1) \times (4 \times "1.5" + 5)$ A1 for 44
10 (a)			4	M1 for two overlapping circles with correct labels M1 for 7 in the intersection A1 for 21 in the correct place A1 for 3 in the correct place
(b)		$\frac{21}{36}$	2	M1 for $\frac{a}{36}$ $a < 36$ or $\frac{"21"}{b} b > "21"$ A1 for $\frac{21}{36}$ oe

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Question	Working	Answer	Mark	Notes
11 (a)		60	1	B1 cao
(b)		9	2	M1 for $\frac{15}{5}$ or $\frac{5}{15}$ or 3 or $\frac{1}{3}$
(c)		4.5	2	A1 cao M1 for $13.5 \div \frac{15}{5}$ oe or $13.5 \times \frac{5}{15}$ oe A1 for 4.5 oe
12 (a)(i)		6×10^4	2	B1 cao
(ii)		0.0082	2	B1 cao
(c)		1.2×10^{12}		M1 for $12 \times 10^{5+6}$ oe A1 cao
13 (a)		$7^{1/3}$	2	M1 for $5x - 2x = 19 + 3$ A1 for $7^{1/3}$ oe
(b)		7, -2	3	M1 for $(y \pm 7)(y \pm 2)$ A1 for $(y - 7)(y + 2)$ A1 for 7 and -2 or M1 for $\left(y - \frac{5}{2}\right)^2$ seen M1 for $\left(y - \frac{5}{2}\right)^2 = 14 + \left(\frac{5}{2}\right)^2$ A1 for 7 and -2

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Question	Working	Answer	Mark	Notes
14 (a)		1	1	B1 cao
(b)		$\frac{1}{4}$	1	B1 cao
(c)		3.5	3	M1 for $27 = 3^3$ and $9 = 3^2$ M1 for $3^{\frac{3}{2}} = \frac{3^n}{3^2}$ oe A1 for 3.5 oe
15 (a)		$9xy(3x - 4y^2)$	2	M1 for 2 correct factors (3x or 3y or 9x or 9y or xy or 3xy) A1 cao
(b)		$\frac{3}{x+2}$	1	B1 cao
(c)		$(3x - 5)(2x + 1)$	2	M1 $(3x \pm 5)(2x \pm 1)$ A1 cao
(d)		$-\frac{2}{7}$	4	M1 for clearing fractions M1 for expanding brackets M1 for collecting like terms A1 cao
16		24°	5	M1 for $180 - 90 - 42 (=48)$ M1 for " 48 " $\div 2$ A1 cao C2 for all 3 reasons - angles in a triangle add up to 180° and angle at centre is twice the angle at the circumference and angle between tangent and radius is 90° (C1 for any one reason)

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Question	Working	Answer	Mark	Notes
*17		Proof	3	M1 for sight of 3 consecutive even numbers expressed algebraically eg. $2n, 2n + 2, 2n + 4$ M1 (dep) for $2n + 2n + 2 + 2n + 4$ C1 for “ $6n + 6$ ” and correct reasoning eg ‘ $6n + 6$ is divisible by 6 as $6(n + 1)$ ’ and definition of n as an integer
18	$\frac{3}{10} \times \frac{7}{9} + \frac{2}{10} \times \frac{8}{9} +$ $\frac{5}{10} \times \frac{5}{9}$	$\frac{62}{90}$	4	B1 for $\frac{8}{9}$ or $\frac{7}{9}$ or $\frac{5}{9}$ M1 for $\frac{3}{10} \times \frac{7}{9}$ or $\frac{2}{10} \times \frac{8}{9}$ or $\frac{5}{10} \times \frac{5}{9}$ M1 for $\frac{3}{10} \times \frac{7}{9} + \frac{2}{10} \times \frac{8}{9} + \frac{5}{10} \times \frac{5}{9}$ A1 for $\frac{62}{90}$ oe or B1 for $\frac{4}{9}$ or $\frac{1}{9}$ or $\frac{2}{9}$ M1 for $\frac{3}{10} \times \frac{2}{9} + \frac{2}{10} \times \frac{1}{9} + \frac{5}{10} \times \frac{4}{9} (= \frac{28}{90})$ M1 for $1 - \frac{28}{90}$ A1 for $\frac{62}{90}$ oe

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Question	Working	Answer	Mark	Notes
19	$3 \times BP = 4 \times 12$ oe	16	2	M1 for $3 \times BP = 4 \times 12$ oe A1 cao
20	$\frac{1}{2} \times \frac{12}{\sqrt{3}} \times \frac{10}{\sqrt{2}} \times \frac{\sqrt{6}}{\sqrt{6}}$	$10\sqrt{6}$	3	M1 for $\frac{1}{2} \times \frac{12}{\sqrt{3}} \times \frac{10}{\sqrt{2}}$ M1 for $\frac{1}{2} \times \frac{12}{\sqrt{3}} \times \frac{10}{\sqrt{2}} \times \frac{\sqrt{6}}{\sqrt{6}}$ or multiplication of numerator and denominator by a surd that will rationalize the fraction A1 oe
21	(a)(i)	$3a + 3c$	4	B1 for $3a + 3c$ or $3(a + c)$
	(ii)	$2c - a$		B1 for $\overrightarrow{OP} = \frac{2}{3}\overrightarrow{OB}$ or $\overrightarrow{OP} = \frac{2}{3}(3a + 3c)$ ($=2a + 2c$) M1 for $\overrightarrow{AP} = \overrightarrow{AO} + \overrightarrow{OP}$ or $-3a + \frac{2}{3}(3a + 3c)$ A1 for $2c - a$ oe
	(b)		3	M1 for $\overrightarrow{AM} = \overrightarrow{AO} + \overrightarrow{OC} + \overrightarrow{CM}$ or $-3a + 3c + 3a/2$ A1 for $3c - 3a/2$ oe C1 for $\overrightarrow{AM} = \frac{3}{2}\overrightarrow{AP}$ therefore APM is a straight line oe